

## TWO NEW EARTHWORM SPECIES (Oligochaeta, Megascolecidae) FROM VIETNAM

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**ABSTRACT:** Two new earthworm species are described from An Giang Province, southern Vietnam. *Metaphire nhuongi* sp. n. is distinguished from its congeners by having four pairs of spermathecal pores in lateroventral intersegments 5/6/7/8/9, and two pairs of genital markings in 17/18 and 18/19. *Polypheretima alba* sp. n. is recognized by multiple spermathecal pores in dorsal intersegments 4/5/6/7, genital markings 4-6 pairs on xix-xxiii, and body whitish.

**Keywords:** Megascolecidae, *Metaphire*, *Polypheretima*, earthworms, new species, Vietnam.

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### INTRODUCTION

An Giang is located in the Cuu Long river delta of the southernmost part of Vietnam. Its area is about 3,406.23 km<sup>2</sup> with a majority part of delta (accounting for 87% its area) while hilly regions account for only 13%. Climate is monsoon tropical with annual average temperature of 27°C, and two seasons: rainy one (from May to November) and dry one (from December to next April) (Le Thong, 2006). The fauna and flora of the region are very diverse, and many new species have been discovered recently (Nguyen Thanh Tung, Tran Thi Anh Thu, 2008).

To date, 18 earthworm species belonging to 9 genera, 5 families have been reported from An Giang province (Nguyen Thanh Tung et al., 2012). Of these species, four were previously described: *Metaphire mangophila* (Nguyen, 2011); *Metaphire bairi* (Nguyen, 2011); *Metaphire dorsomultitheca* Nguyen & Nguyen, 2015 and *Amyntas nhonmontis* Nguyen & Nguyen, 2015. This paper is devoted to describe two more new earthworm species from An Giang Province, Vietnam.

### MATERIALS AND METHODS

Materials were collected from top soil layer.

Earthworms were firstly cleaned by tap water, killed with 2% formalin, and then fixed in 4% for 12 hour. All specimens were preserved in 4% formalin.

Specimens were directly observed under the microscope Motic DM143 FBGG C. Images were taken using the camera attached to the microscope. Line drawings were made based on the observation under the microscope. All images were grouped using the Photoshop CS6.

Holotypes and paratypes are deposited in the Laboratory of Zoology, Department of Biology, Can Tho University (=CTU), Can Tho city, Vietnam.

### RESULTS AND DISCUSSION

*Metaphire nhuongi* Nguyen, sp. n. (Fig. 2)

**Examined material:** *Holotype:* 1 mature (CTU-EW.024.h01), natural forest (10°18'07.4"N; 104°32'06.1"E), Co To mountain, Tri Ton district, An Giang Province, 09/11/2010, coll. Nguyen Thanh Tung. *Paratypes:* 6 matures (CTU-EW.024.p02), same data as holotype; 2 matures (CTU-EW.024.p03), Phu Cuong mountain (10°35'02.0"N; 104°56'07.8"E), Tinh Bien District, An Giang province, 7/11/2010, coll. Nguyen Thanh Tung.

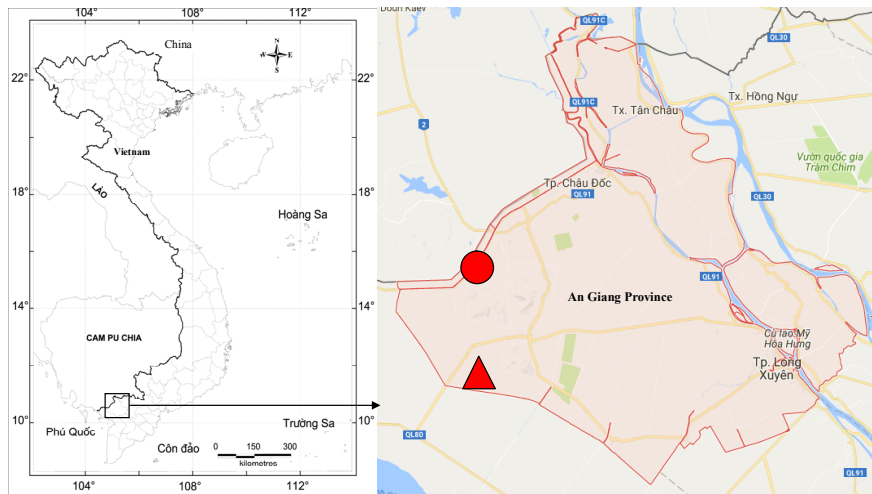


Figure 1. Collection sites of two new earthworms  
 (●: *Metaphire nhuongi*; ▲: *Metaphire nhuongi* & *Polypheretima alba*)

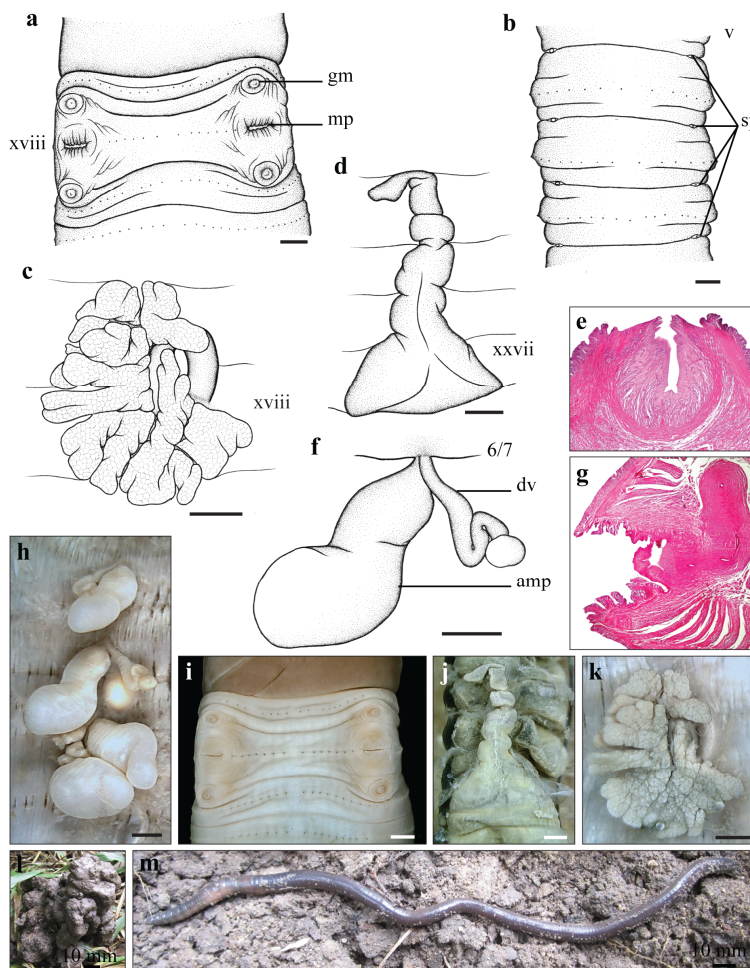


Figure 2. *Metaphire nhuongi* Nguyen, sp. n.

a, i: Male pore region (mp = male pore, gm = genital marking); b: Spermathecal region, ventral view (sp = spermathecal pore); c, k: Prostate gland; d, j: Intestinal caeca; e: Accessory gland, transverse body section; f: Spermathecae (amp = ampulla, dv = diverticula); g: Copulatory pouch, transverse body section; h: Spermathecae in right side; l: Casts; m: Alive mature. Scale bar = 1 mm.

**Diagnosis:** Large size worm, length 213-339 mm, diameter ca. 8.9-9.5 mm. First dorsal pore in 12/13. Spermathecal pores lateroventrally paired in intersegmental furrows 5/6/7/8/9. Genital marking paired in 17/18 and 18/19. Holandric. Intestinal caeca simple. Septa 8/9/10 absent.

**Etymology:** Named after Dr. Do Van Nhuong, a prominent researcher on earthworms in Vietnam.

**Description:** *External characters:* Body cylindrical, large; length 213-339 mm, diameter ca. 8.9-9.5 mm, weight 10.68-22.50 g, segments 120-148. Dorsal blackish grey, ventral paler. Prostomium epilobous (2/3). Setae perichaetine, short; pre-clitellar setae stouter and sparser than post-clitellar setae, 45-51 in viii, 53-75 in xxx, 14-15 between male porophores in xviii; setae distance  $aa = 1.2-1.5ab$ ,  $zz = 1.5-2.0zy$ . Clitellum annular, xiv-xvi, blackish brown, smooth, without setae and dorsal pores. Female pore single, mid-ventral on xiv.

Spermathecal pores four pairs, lateroventral in intersegmental furrows 5/6/7/8/9. Genital markings absent in the spermathecal region. Male pores paired in xviii, ventrolateral; copulatory pouches present; ventral distance between male pores about 0.33x body circumference. Two pairs of small, round genital markings in intersegments 17/18 and 18/19, respectively, in line with male pores.

*Internal characters:* Septa 5/6/7/8 thickened, 8/9/10 absent, 10/11/12/13 thin. Oesophageal gizzard large, within viii-ix. Intestinal origin at xv; caeca simple, within xxvii-xxii or xxvii-xxiii. Last hearts in xiii. Pharyngeal micronephridia well developed in 4/5/6. Lymph glands from 15/16. Typhlosole simple, lamelliform.

Spermathecae paired in vi-ix. Spermathecal ampulla mango-shaped, duct extremely short or almost absent. Diverticula shorter than ampulla, waved in the middle, attached to ampulla at base; distal part enlarged to be an oval-shaped, opalescent seminal chamber. Accessory glands absent in the spermathecal region.

Holandric, testes sacs ventrally paired in x and xi, separated and yellowish. Seminal

vesicles developed in xi and xii. Ovaries well developed in 12/13. Ovisacs small in 12/13. Prostate glands racemose, deeply lobuled, paired within xvii-xix; prostatic ducts short and stout. Accessory glands absent in the male region.

**Locality and habitat:** The new species was commonly found in a mango garden in Phu Cuong Mountain (Tinh Bien District) and Co To Mountain (Tri Ton District). Soils are medium clays. Their casts form big piles on soil surface, but not lumps.

**Remarks:** The new species is fairly similar to *M. peguana* (Rosa, 1890), *M. pacseana* (Thai & Samphon, 1988) và *M. stephensoni* (Michaelsen, 1934b) in having two pairs of genital markings in 17/18 and 18/19, no genital markings on the spermathecal region, prostomium epilobous and septa 8/9/10 absent. However, *M. nhuongi* sp. nov. can be recognized by its larger size (diameter ca. 8.9-9.5 mm) and having four pairs of spermathecal pores in 5/6/7/8/9.

In addition, the new species is closely similar to *M. anhumalatana* (Thai & Huynh, 1993), *M. dalatana* (Michaelsen, 1934b), *M. langbiangi* (Michaelsen, 1934b), *M. seponensis* (Thai & Samphon, 1989), *M. bianensis* (Stephenson, 1931) in having four pairs of spermathecal pores in intersegments 5/6/7/8/9. However, the new species differs from those species in larger size (diameter ca. 8.9-9.5 mm) and having two pairs of genital markings in 17/18 and 18/19, while other similar species are smaller (diameter less than 8 mm) and no genital markings on the male region.

***Polypheretima alba* Nguyen, sp. n.** (Fig. 3, Table 1)

Examined material: *Holotype*: 1 mature (CTU-EW.101.h01), long-term tree garden (10°23'27.2"N; 104°59'56.1"E), Co To mountain, Tri Ton District, An Giang Province, 27/11/2014, coll. Nguyen Thanh Tung. *Paratypes*: 8 matures (CTU-EW.101.p02), same data as for the holotype.

**Diagnosis:** Small size worm, length 57-109 mm, diameter ca. 3.2-4.6 mm. Body uniformly

whitish. First dorsal pore in 12/13. Spermathecal pores multiple, dorsal in intersegments 4/5/6/7/8. Genital marking large, paired on xix-xxiii. Copulatory pouches present. Intestinal caeca absent. Holandric.

**Etymology:** “*alba*” is an adjective in apposition to emphasize the whitish coloration of the species.

**Description:** *External characters:* Body cylindrical, the posteriormost part gradually tapering towards telson. Small size worm, length 57-109 mm, diameter ca. 3.2-4.6 mm, weight 0.35-0.95 g, segments 123-187. Body uniformly whitish. Prostomium epilobous (1/2). First dorsal pore in 12/13. Pre-clitellar setae stouter and thicker than post-clitellar setae,

55-86 in viii, 46-68 in xxx, 10-15 between two male porophores; setae distance aa=1-1.5ab, zz=1.2-2.0zy. Clitellum annular, xiv-xvi, opalescent, smooth, without setae and dorsal pores. Female pore single, mid-ventral on xiv.

Spermathecal pores multiple, dorsal in intersegmental furrows 4/5/6/7/8, but pores in 7/8 almost invisible. Genital markings large, rectangular, ventrally paired on vi and vii. Male porophores highly elevated, male pores located inside copulatory pouches in xviii; ventral distance between two male pores about 0.35x body circumference. Genital markings large, 4-6 pairs on xix-xxiii, in line with male pores; anterior pairs smaller than posterior ones.

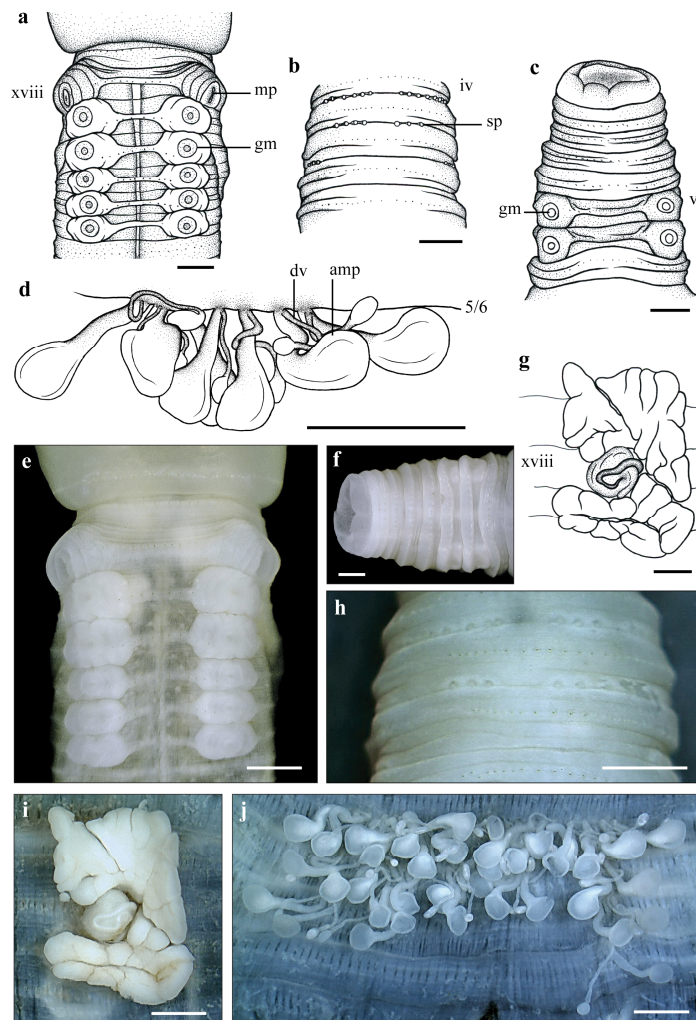


Figure 3. *Polypheretima alba* Nguyen, sp. n.

a, e: Male pore region (mp = male pore, gm = genital marking);  
 b, h: Spermathecal region, dorsal view (sp = spermathecal pores);  
 c, f: Spermathecal region, ventral view (gm = genital marking);  
 d: Spermathecae in 5/6, right side (amp = ampulla, dv = diverticulum);  
 g, i: Prostate gland, right side;  
 j: Spermathecae. Scale bar = 1 mm.

Table 1. Spermathecae number of *Polypheretima alba* sp. n.

Specimens	Position	Left	Right	Total
Holotype	4/5	9	9	18
	5/6	7	9	16
	6/7	2	3	5
	7/8	1	0	1
Paratype 1	4/5	9	11	20
	5/6	9	11	20
	6/7	3	5	8
	7/8	2	1	3
Paratype 2	4/5	11	11	22
	5/6	9	10	19
	6/7	6	4	10
	7/8	2	1	3
Paratype 3	4/5	10	9	19
	5/6	9	9	18
	6/7	7	6	13
	7/8	1	1	2
Paratype 4	4/5	10	11	21
	5/6	11	9	20
	6/7	6	3	9
	7/8	1	1	2
Paratype 5	4/5	10	9	19
	5/6	8	7	15
	6/7	3	3	6
	7/8	0	1	1
Paratype 6	4/5	10	12	22
	5/6	8	10	18
	6/7	4	6	10
	7/8	1	2	3
Paratype 7	4/5	11	10	21
	5/6	8	10	18
	6/7	8	6	14
	7/8	3	1	4
Paratype 8	4/5	12	12	24
	5/6	10	9	19
	6/7	6	4	10
	7/8	1	2	3

*Internal characters:* Septa 5/6/7/8 thickened, 8/9/10 absent, 10/11/12 thin. Oesophageal gizzard within viii-ix. Intestinal origin at xv; caeca absent. Last hearts in xiii. Pharyngeal micronephridia poorly developed on septum 5/6, and more developed on septum 6/7. Lymph glands present from 15/16, saccule-shaped. Typhlosole simple, lamelliform.

Spermathecae variable, about 41-57

altogether in v-viii: 18-24 in v, 15-20 in vi, 6-14 in vii, 1-4 in viii (table 1). Spermathecal ampulla oval-shaped; duct long, ca. 2/3 ampulla length. Diverticula shorter than ampulla; distal part enlarged to be an opalescent seminal chamber; duct attached to base of ampulla. Accessory gland absent in the spermathecal region.

Holandric. Testes sacs developed in x-xi,

separated. Seminal vesicles well developed, paired in xi-xii. Ovaries on septum 12/13 posteriorly; ovisacs well developed, opalescent in 12/13. Prostate glands deeply lobuled, paired in xvii-xix, or xvii-xx; prostatic ducts slightly smaller towards pores. Accessory absent in the male region.

**Locality and habitat:** This species was found in a mango garden in Co To mountain (Tri Ton District). They usually live in soils with high humidity and mould. Their casts are small and twisted lumps.

**Remarks:** The new species is fairly similar to *Polypheretima elongata* (Perrier, 1872) in having numerous genital markings pairedly arranging on segment xix onwards. However, *Po. elongata* differs from this new species in having spermathecal pores in ventrolaterally intersegmental furrows 5/6/7 and no genital markings on the spermathecal region. In contrast, the new species has spermathecal

pores in dorsally intersegmental furrows 4/5/6/7/8 and genital markings paired on vi and vii.

In comparison to other polythecal species, the new species is close to *Po. koyana* (Michaelsen, 1934a), *Po. lesonea* Easton, 1979 and *Po. polytheca* (Beddard, 1900) in having four spermathecal segments and genital markings pairedly arranging on the male region. However, the new species is distinguished from other similar species by spermathecal pores in dorsal 4/5/6/7/8 and 4-6 pairs of genital markings on xix-xxiii. Three species, *Po. koyana*, *Po. lesonea* and *Po. polytheca*, differ from the new species in spermathecal pores in lateroventral or ventral 5/6/7/8/9, and genital markings paired on xvii, xix, xx (in *Po. koyana*), or on xvii, xix-xxii (in *Po. lesonea*) or on xviii, xix (in *Po. polytheca*). Character comparison among four species is presented in table 2.

Table 2. Comparison of the characters among *Po. alba*, *Po. koyana*, *Po. lesonea* and *Po. polytheca*

No.	Characters	<i>Po. alba</i>	<i>Po. koyana</i>	<i>Po. lesonea</i>	<i>Po. polytheca</i>
1	Length (mm)	57-109	175 - 225	73-88	44-50
2	Diameter (mm)	3.2-4.6	3.5-4	2-3	1.5-2
3	First dosal pore	12/13	12/13	11/12	12/13
4	Spermathecal pores	4/5/6/7/8, dorsally	5/6/7/8/9, ventrolaterally	5/6/7/8/9, ventrolaterally	5/6/7/8/9, ventrally
5	GM in spermathecal region	2 pairs, vi - vii	2 pairs, vii - viii	absent	2 pairs, vi - viii
6	GM in male pore region	4-6 pairs, xix-xxiii	3 pairs, xvii, xix, xx	5 pairs, xvii, xix-xxii	2 pairs in xviii, xix
7	Last hearts	xiii	xiii	xiii	xii
8	Spermathecae	41-57 in total	Maximum 9/segment	1 pair/segment in vi-viii, numerous in ix	6-10 in total

GM: genital markings.

REFERENCES

Nguyen Duc Anh, Nguyen Thanh Tung, 2015. Notes on *Metaphire multitheca* (Chen, 1938) (Oligochaeta, Megascolecidae) recorded from Vietnam, with descriptions of two new species. *ZooKeys*, 506: 127-136.

Thai Tran Bai, Do Van Nhuong, Huynh Thi Kim Hoi, 1993. New species of earthworms of genus *Pheretima* Kinberg, 1867 (Megascolecidae - Oligochaeta) from Yokdon, Daclac province. *Tap chi Sinh hoc*, 15(4): 12-15.

Thai Tran Bai, Samphon K., 1988. New species and subspecies of earthworms from Laos. *Journal of Science of HNUE*, C: 3-24.

Thai Tran Bai, Samphon K., 1989. Initial

- remarks on the fauna of earthworms in Laos (from Muong Phuon to Bualaven plateau). Journal of Science of HNUE, special issue: 61-75.
- Beddard F. E., 1900. On the Earthworms collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900. Proceedings of the Zoological Society of London, 1900: 891-911.
- Easton E. G., 1979. A Revision of the "acaecate" Earthworms of the *Pheretima* Group (Megascolecidae: Oligochaeta): *Archipheretima*, *Metapheretima*, *Planapheretima*, *Pleionogaster*, and *Polypheretima*. British Museum (Natural History), 35: 1-126.
- Michaelsen W., 1934a. Oligochaeta from Sarawak. Quarterly Journal of Microscopical Science, 77: 1-47.
- Michaelsen W., 1934b. Oligochäten von Franzosisch-Indochina. Archs. Zool. Exp. Gen, 76: 493-456.
- Perrier E., 1872. Recherches pour servir à l'histoire des Lombriciens terrestres. Nouvelles Archives du Muséum d'Histoire Naturelle de Paris, 8: 5-198.
- Rosa D., 1890. Viaggio di Leonardo Fea in Birmanica e regioni vicini, XXVI. Perichaetidi. Annali del Museo civico di storia naturale Giacomo Doria, 10: 107-122.
- Stephenson, J. 1931. Oligochaeta from Burma, Kenya, and other parts of the world. Proceedings of the Zoological Society of London, 101(1): 33-92.
- Le Thong, 2006. Geography of Provinces and Cities of Vietnam (Volume 6). Vietnam Education Publishing House, Hanoi, Vietnam, pp. 579.
- Nguyen Thanh Tung, 2011. Descriptions of two new species of earthworm of the genus *Pheretima* Kinberg, 1867 (Oligochaeta: Megascolecidae) from Mekong Delta-Vietnam. Tap chi Sinh hoc, 33(1): 24-29.
- Nguyen Thanh Tung, Trinh Thi Kim Binh, Le Van Nhan, Nguyen Duc Anh, 2015. On the polythecate earthworms of the genus *Metaphire* (Oligochaeta: Megascolecidae) from Vietnam, with descriptions of three new species. Raffles Bulletin of Zoology, 63: 461-470.
- Nguyen Thanh Tung, Nguyen Thi Kim Phuoc, Ho Minh Thuan, 2012. The diversity and distribution of earthworms in An Giang province. Journal of Science of Can Tho University, 22a: 144-153.
- Nguyen Thanh Tung, Tran Thi Anh Thu, 2008. Composition and distribution of earthworms in the belt of Tien river. Journal of Science of Can Tho University, 10: 59-66.

## HAI LOÀI GIUN ĐẤT MỚI (*Oligochaeta*, *Megascolecidae*) Ở VIỆT NAM

Nguyễn Thanh Tùng

Bộ môn Sư phạm Sinh học, Khoa Sư phạm, Trường Đại học Cần Thơ

### TÓM TẮT

Bài báo mô tả 2 loài giun đất mới thuộc giống *Metaphire* Sims & Easton, 1972 và *Polypheretima* Michaelsen, 1934, đó là *Metaphire nhuongi* sp. n. và *Polypheretima alba* sp. n.. *Metaphire nhuongi* sp. n. là loài có kích thước lớn nhất được ghi nhận ở Đồng bằng sông Cửu Long cho đến nay. Loài này có 4 đôi lỗ nhận tinh ở phía bên bụng ở rãnh gian đốt 5/6/7/8/9, 2 đôi nú phụ sinh dục ở rãnh gian đốt 17/18 và 18/19. *Polypheretima alba* sp. n. khác biệt so với các loài cùng giống ở đặc điểm nhiều lỗ nhận tinh phía lưng ở 4/5/6/7/8, cơ thể màu trắng trong, nú phụ sinh dục xếp thành từng đôi (có từ 4 đến 6 đôi từ đốt xix-xxiii).

*Từ khóa:* Megascolecidae, *Metaphire*, *Polypheretima*, giun đất, loài mới, Việt Nam.